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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the manufacturing method of the efficient acid gas processing agent which can remove efficiently the acid gas ingredient in acid gas, such as waste gas containing an acid gas ingredient, especially garbage incineration waste gas.

[0002]

[Description of the Prior Art]The waste gas produced from an incinerator, a thermal power plant, other boilers, etc., Since acid gas ingredients, such as a sulfur oxide and hydrogen chloride, are generally contained so much, this is usually contacted to basic alkaline earth metal compound aqueous suspension in a reactor, and it is considered as the granular material of sulfate or a chloride, and after a bag filter and an electrical dust precipitator separate this, a part for gas is emitted into the atmosphere.

[0003]By the way, when the industrial use slaked lime which considers it as an acid gas processing agent, for example, is usually marketed is used as aqueous suspension and used, the mean particle diameter of the slaked lime particles in this suspension is as large as 15-30 micrometers, and specific surface area is as small as $5\text{-}20\text{-m}^2/\text{g}$. In this case, the reactivity of the acid gas ingredient and slaked lime which are generally contained in waste gas, Since there are surface area of slaked lime particles and correlation and reactivity with an acid gas ingredient becomes settled in proportion [almost] to the surface area of slaked lime particles, The reaction of slaked lime and the acid gas ingredient in waste gas occurred only on the surface of particles, but since most acid gas processing agents will be discharged as dust while it has been unreacted, it needed to supply the 2-3-times the amount acid gas processing agent of the acid gas ingredient by the mole ratio. Since particle diameter was large, the injection nozzle was got blocked in many cases, and precipitate and a blockade might be caused on the occasion of transportation among a pipe. In order to solve such a problem, the

method of digesting grinding quicklime and manufacturing particle slaked lime suspension, and the method of microatomizing slaked lime particles by ultrasonic irradiation are known, but. Also in [need a complicated device for processing of the steam sake / a steam /, generated heat and generated in which a digesting process is performed inside a grinder by the former method, and] which method, When it was suspension with high concentration since the viscosity of this suspension rises as the mean particle diameter of the slaked lime particles in suspension became small by microatomizing slaked lime particles, there was a problem of mobility having fallen in a suspension tank and piping, or causing a blockade depending on the case. There were some which contain SiO_2 as non-purity depending on slaked lime, and there was a problem that the coarse particle will wear piping and an injection nozzle remarkably.

[0004]

[Problem(s) to be Solved by the Invention]This invention solves the problem which the acid gas processing agent which consists of the above-mentioned conventional slaked lime content suspension has, and is made for the purpose of providing the method of manufacturing the efficient acid gas processing agent which is efficient and removes the acid gas ingredient in acid gas.

[0005]

[Means for Solving the Problem]This invention persons by carrying out grinding treatment of the aqueous suspension of slaked lime particles which have predetermined specific surface area until it satisfies a predetermined condition as a result of repeating research wholeheartedly about the above-mentioned manufacturing method of a desirable efficient acid gas processing agent, An acid gas processing agent which consists of aqueous suspension of slaked lime particles with small particle diameter in which specific surface area increased is obtained, And it finds out that it ** to an improvement of improvement in an extraction ratio of an acid gas ingredient, reduction of a processing agent amount of consumption, piping, prevention from a blockade of an injection nozzle and prevention from wear, and transportation among a pipe, and came to complete this invention based on this knowledge.

[0006]Namely, this invention is a limit where the specific surface area X made slaked lime particles of $5.0\text{-}20.0\text{-m}^2/\text{g}$ suspended and where viscosity does not exceed 150cP for slaked lime aqueous suspension of 0.1 to 30% of the weight of solids concentration, A manufacturing method of an efficient acid gas processing agent which consists of aqueous suspension of slaked lime carrying out grinding treatment is provided until the specific surface area Y of slaked lime particles after grinding treatment (m^2/g) satisfies formula $Y \geq 0.0036X^2 + 0.689X + 7.2055$.

[0007]

[Embodiment of the Invention]Slaked lime particles are suspended underwater, and the slaked

lime aqueous suspension by which grinding treatment is carried out in this invention method has 0.1 to 30% of the weight of solids concentration, and slaked lime particles have the specific surface area of $5.0\text{-}20.0\text{-m}^2/\text{g}$.

[0008]Slaked lime particles are made suspended in water, or wet slaking of the quicklime is carried out, and this slaked lime aqueous suspension adds water if needed, it performs concentration adjustment and is prepared. Slaked lime particles are usually manufactured by dry slaking of quicklime. Although quicklime in particular is not restricted, what is depended on calcining of limestone is common. In order to prepare slaked lime aqueous suspension advantageously, quicklime is digested, and the slaked lime particles of $5.0\text{-}20.0\text{-m}^2/\text{g}$ are made to generate, and specific surface area makes it suspended underwater, and uses this particle as suspension. Under the present circumstances, the solids concentration in suspension is adjusted to 0.1 to 30% of the weight.

[0009]In this invention method, the specific surface area Y of the slaked lime particles after grinding treatment of grinding treatment (m^2/g) is the above-mentioned slaked lime aqueous suspension Formula $Y \geq 0.0036X^2 + 0.689X + 7.2055$ (I)

Grinding treatment is carried out until it satisfies preferably formula

$Y \geq 0.0004X^2 + 0.7936X + 9.7185$ [X in these formulas is the specific surface area (m^2/g) of the slaked lime particles in the slaked lime aqueous suspension by which grinding treatment is carried out]. When it has the specific surface area in which the slaked lime particles after grinding treatment are lower than the value of the right-hand side of above formula (I), The acid gas ingredient extraction ratio improved effect by grinding treatment is not fully acquired, must use more dosages of an acid gas processing agent for attaining a removing effect equivalent to this invention, and does not escape becoming disadvantageous also in cost.

[0010]Grinding treatment is performed in the limit where the viscosity of suspension does not exceed 150cP. As a device used for grinding treatment, a desirable mechanical thing, for example, a sand mill, a ball mill, a vibration mill, etc. are mentioned.

[0011]In this invention method, in order to control the particle diameter of the particles in this suspension after grinding treatment if needed, cyclone processing is performed. It is advantageous that particle diameter shall be 15 micrometers or less by this processing. If coarse particles which are not ground, such as SiO_2 , may be contained in slaked lime aqueous suspension also after the above-mentioned grinding treatment and the larger coarse particle than 15 micrometers is contained, in order to wear piping and an injection nozzle remarkably, Although it is not desirable, such a problem stops arising by cyclone processing.

[0012]Thus, particle diameter becomes fine, the aqueous suspension of the hypoviscosity containing the slaked lime particles to which specific surface area increased is obtained, and this suspension remains as it is and can be made into an acid gas processing agent.

[0013]In this invention method, in order to adjust viscosity the time of grinding treatment, or after grinding treatment or the time of grinding treatment, and grinding treatment, a dispersing agent can be added to suspension. As this dispersing agent, carboxylate and the thing which uses the alkali metal salt of carboxylic acid or alkaline earth metal salt, especially sodium salt as the main ingredients especially are used preferably. the addition of a dispersing agent receives the whole quantity of slaked lime -- 0.01 to 10.0% of the weight of the range -- it is preferably chosen in 0.05 to 5.0% of the weight of the range. If there are too few additions, a dispersion effect will not fully be acquired, and if too large, acid gas ingredient removal ability will decline.

[0014]Since the viscosity of this suspension rises and it will become easy to produce a trouble in a suspension tank and piping if the mean particle diameter of the slaked lime particles in suspension becomes small by grinding slaked lime particles in the acid gas processing agent of this invention, The viscosity of suspension needs to be referred to as 150 or less cP, and it is preferably advantageous to be more preferably referred to [100 or less cP] as 20 or less cP.

[0015]As for the acid gas processing agent obtained by this invention method, it is advantageous that solids concentration is 1 to 20% of the weight of a range also in 0.1 to 30 % of the weight. If solids concentration becomes lower than 0.1 % of the weight, acid gas ingredient removal ability will decline, and if it becomes higher than 30 % of the weight, the viscosity of suspension will become high too much.

[0016]this invention method can demonstrate an effect well especially as a method of improving in the case of using the slaked lime particles which have low specific surface area originally, for example, the slaked lime which carried out dry slaking of the dish-grilled-with-salt quicklime, and the slaked lime in which many coarse particles are contained and which is not quality as an acid gas processing agent.

[0017]In order to process acid gas using the efficient acid gas processing agent manufactured by this invention method, it is common to inject this efficient acid gas processing agent, and to remove an acid gas ingredient to acid gas. The efficient acid gas processing agent used for such an acid gas disposal method, Usually, in acid gas generating institutions, such as an incinerator plant, as what was manufactured beforehand, For example, accommodate in a suspension tank and use is presented, and also may make it manufacture on that spot in acid gas generating institutions, such as an incinerator plant, and as an example of manufacture in this case, The aqueous suspension of the slaked lime particles of specific surface area 2 [of 5.0-20.0 m²/g prepared by digestion of quicklime etc. is accommodated in the suspension tank established in this generating institution, Milling plants, such as a ball mill, are formed in the channel between this suspension tank and reactor, classifiers, such as a cyclone, are formed further if needed, the slaked lime particles in this suspension are ground, and what was

classified further if needed is mentioned.

[0018]

[Example]Next, although an example explains this invention still in detail, this invention is not limited at all by these examples. In each example and a comparative example, the mean particle diameter and the BET specific surface area of slaked lime particles in the suspension after grinding treatment extract some suspension after grinding treatment, And slaked lime particles are separated and measured, viscosity is the value measured at 25 °C and 60 rpm using the rotation viscometer, the acidic component concentration in each waste gas is the average value of one time integration value, and the above-mentioned BET specific surface area means the specific surface area measured with the BET adsorption method.

[0019]Water is added to the mean particle diameter of 9.4 micrometers and JIS special number slaked lime (made by an Okutama industrial company) of 14.8 m² of BET specific surface area /g which digested and obtained example 1 quicklime, Agitation mixing was carried out, it was considered as the aqueous suspension of 7 % of the weight of solids concentration, and the suspension of viscosity 12cP was obtained by grinding the slaked lime particles in this suspension through this to a Sand grinder, and carrying out detailed granulation at the mean particle diameter of 1.8 micrometers, and 28.4 m² of BET specific surface area /g. Waste gas processing at the time of operation of the incinerator of 100 t/day of throughput was performed using this suspension as an acid gas processing agent. 580 ppm and SO₂ are 40 ppm and HCl injected the concentration of the acidic component in the waste gas in the waste gas flue entrance of a waste gas processing tower to the entrance total quantity of HCl and SO₂ at a rate that the amount of slaked lime turns into about 1.5 Eq in an acid gas processing agent. HCl was 11 ppm, SO₂ of the concentration of the acidic component in a tower exit was 7 ppm, and HCl was [SO₂ of the extraction ratio] 83% 98%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 °C.

[0020]Water is added to the mean particle diameter of 9.4 micrometers and JIS special number slaked lime (made by an Okutama industrial company) of 14.8 m² of BET specific surface area /g which digested and obtained example 2 quicklime, Agitation mixing was carried out, and it was considered as the aqueous suspension of 20 % of the weight of solids concentration, and was considered as the suspension of viscosity 90cP by grinding the slaked lime particles in this suspension using a ball mill, and carrying out detailed granulation at the mean particle diameter of 2.3 micrometers, and 25.3 m² of BET specific surface area /g. AT-40 (made by Toagosei) was added 0.2% of the weight to the amount of slaked lime as a dispersing agent to this, and viscosity was set to 25cP. Waste gas processing was performed

like Example 1 except having used this suspension as an acid gas processing agent. HCl was 15 ppm, SO₂ of the concentration of the acidic component in the waste gas in a tower exit was 7 ppm, and HCl was [SO₂ of the extraction ratio] 83% 97%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0021]Water is added to slaked lime of the mean particle diameter of 15.5 micrometers and 5.8 m of BET specific surface area ²/g which obtained it by carrying out dry slaking of the example 3 dish-grilled-with-salt quicklime, Agitation mixing was carried out, and it was considered as the aqueous suspension of 15 % of the weight of solids concentration, and was considered as the suspension of viscosity 98cP by grinding the particles in this suspension using a Sand grinder, and carrying out detailed granulation at the mean particle diameter of 5.1 micrometers, and 20.6 m of BET specific surface area ²/g. AT-40 (made by Toagosei) was added 0.2% of the weight to the amount of slaked lime as a dispersing agent to this, and viscosity was set to 25cP. Waste gas processing was performed like Example 1 except having used this suspension as an acid gas processing agent. HCl was 20 ppm, SO₂ of the concentration of the acidic component in the waste gas in a tower exit was 8 ppm, and HCl was [SO₂ of the extraction ratio] 80% 97%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0022]Water is added to slaked lime of the mean particle diameter of 15.5 micrometers and 5.8 m of BET specific surface area ²/g which obtained it by carrying out dry slaking of the example 4 dish-grilled-with-salt quicklime, Agitation mixing was carried out, and it was considered as the aqueous suspension of 7 % of the weight of solids concentration, and was considered as the suspension of viscosity 9cP by grinding the particles in this suspension using a Sand grinder, and carrying out detailed granulation at the mean particle diameter of 6.9 micrometers, and 11.5 m of BET specific surface area ²/g. Cyclone processing performed waste gas processing at the time of operation of the incinerator of 100 t/day of throughput from this suspension, using the suspension from which coarse grain with a particle diameter of not less than 15 micrometers was removed as an acid gas processing agent. 580 ppm and SO₂ are 40 ppm and HCl injected the concentration of the acidic component in the waste gas flue entrance of a waste gas processing tower at a rate that the amount of slaked lime turns into about 2 Eq in an acid gas processing agent to the entrance total quantity of HCl and SO₂. HCl was 28 ppm, SO₂ of the concentration of the acidic component in the waste gas in a tower exit was 12 ppm, and HCl was [SO₂ of the extraction ratio] 70% 95%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0023]Agitation mixing of the water was added and carried out to the mean particle diameter of

9.4 micrometers and JIS special number slaked lime (made by an Okutama industrial company) of 14.8 m of BET specific surface area $^2/g$ which digested and obtained example 5 quicklime, and it was considered as the aqueous suspension of 7 % of the weight of solids concentration, and supplied all over the suspension tank of an incinerator plant. The ball mill was formed in the channel between this suspension tank and reactor, and the suspension of viscosity 11cP was obtained by grinding the slaked lime particles in this suspension, and carrying out detailed granulation at the mean particle diameter of 3.9 micrometers, and 23.1 m of BET specific surface area $^2/g$. Waste gas processing at the time of operation of the incinerator of 150 t/day of throughput was performed using this suspension as an acid gas processing agent. 860 ppm and SO_2 are 70 ppm and HCl injected the concentration of the acidic component in the waste gas flue entrance of a waste gas processing tower at a rate that the amount of slaked lime turns into about 1.5 Eq in an acid gas processing agent to the entrance total quantity of HCl and SO_2 . HCl was 34 ppm, SO_2 of the concentration of the acidic component in a tower exit was 13 ppm, and HCl was [SO_2 of the extraction ratio] 81% 96%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 °C.

[0024]Agitation mixing of the water was added and carried out to slaked lime of the mean particle diameter of 15.5 micrometers and 5.8 m of BET specific surface area $^2/g$ which obtained it by carrying out dry slaking of the example 6 dish-grilled-with-salt quicklime, and it was considered as the aqueous suspension of 15 % of the weight of solids concentration, and supplied all over the suspension tank of an incinerator plant. Form a ball mill in the channel between this suspension tank and reactor, and AT-40 (made by Toagosei) is added at 0.7% of the weight of a rate to the amount of slaked lime as a dispersing agent, The suspension of viscosity 10cP was obtained by grinding the slaked lime particles in this suspension, and carrying out detailed granulation at the mean particle diameter of 4.1 micrometers, and 21.0 m of BET specific surface area $^2/g$. Waste gas processing was performed like Example 5 except having used this suspension as an acid gas processing agent. HCl was 43 ppm, SO_2 of the concentration of the acidic component in a tower exit was 18 ppm, and HCl was [SO_2 of the extraction ratio] 74% 95%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 °C.

[0025]The aqueous suspension of the mean particle diameter of 5.8 micrometers which obtained it by carrying out wet slaking of the example 7 dish-grilled-with-salt quicklime, and 15 % of the weight of solids concentration containing the slaked lime particles of 18.9 m of BET specific surface area $^2/g$ was thrown in all over the suspension tank of an incinerator plant.

Form a ball mill in the channel between this suspension tank and reactor, and AT-40 (made by Toagosei) is added at 0.7% of the weight of a rate to the amount of slaked lime as a dispersing agent, The suspension of viscosity 13cP was obtained by grinding the slaked lime particles in this suspension, and carrying out detailed granulation at the mean particle diameter of 3.6

micrometers, and 24.0 m of BET specific surface area $^2/\text{g}$. Waste gas processing was performed like Example 5 except having used this suspension as an acid gas processing agent. HCl was 29 ppm, SO_2 of the concentration of the acidic component in a tower exit was 17 ppm, and HCl was [SO_2 of the extraction ratio] 76% 97%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0026]The slaked lime suspension produced by making it be the same as that of example 8 Example 4 was diluted with water, and it was considered as 3 % of the weight of solids concentration. When the wear test of the bronze wire was done with the abrasion tester by Nippon Filcon Co., Ltd. and it measured on the conditions for 30 minutes using this suspension, the wire abrasion degree was 5.0 mg.

[0027]Water is added to the mean particle diameter of 9.4 micrometers and JIS special number slaked lime (made by an Okutama industrial company) of 14.8 m of BET specific surface area $^2/\text{g}$ which digested and obtained comparative example 1 quicklime, It remained as it is, the suspension of 7 % of the weight of solids concentration and viscosity 19cP which carried out agitation mixing and was prepared was used as an acid gas processing agent, and waste gas processing at the time of operation of the incinerator of 100 t/day of throughput was performed. 580 ppm and SO_2 are 40 ppm and HCl injected the concentration of the acidic component in the waste gas flue entrance of a waste gas processing tower at a rate that the amount of slaked lime turns into about 2 Eq in an acid gas processing agent to the entrance total quantity of HCl and SO_2 . HCl was 98 ppm, SO_2 of the concentration of the acidic component in a tower exit was 17 ppm, and HCl was [SO_2 of the extraction ratio] 58% 83%.

Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0028]Except that the injection quantity of the comparative example diacid nature gassing agent was made for the amount of slaked lime to turn into about 4 Eq to the entrance total quantity of HCl and SO_2 , waste gas processing was performed like the comparative example 1. HCl was 23 ppm, SO_2 of the concentration of the acidic component in a tower exit was 12 ppm, and HCl was [SO_2 of the extraction ratio] 70% 96%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0029]Waste gas processing was performed like the comparative example 2 except having

used the suspension of 7 % of the weight of solids concentration and viscosity 16cP which added and carried out agitation mixing of the water to slaked lime of the mean particle diameter of 15.5 micrometers and 5.8 m of BET specific surface area $^2/g$ which obtained it by carrying out dry slaking of the comparative example 3 dish-grilled-with-salt quicklime, and prepared it to it as an acid gas processing agent. HCl was 250 ppm, SO_2 of the concentration of the acidic component in a tower exit was 23 ppm, and HCl was [SO_2 of the extraction ratio] 43% 57%. Dust collection of the fly ash in this case was performed by the bag filter good, and waste gas temperature was 175-185 **.

[0030]The slaked lime suspension produced by making it be the same as that of the comparative example 4 comparative example 3 was diluted with water, and it was considered as 3 % of the weight of solids concentration. When the wear test of the bronze wire was done with the abrasion tester by Nippon Filcon Co., Ltd. and it measured on the conditions for 30 minutes using this suspension, the wire abrasion degree was 17.7 mg.

[0031]

[Effect of the Invention]According to this invention method, the extraction ratio of an acid gas ingredient reactivity with the acid gas ingredient in acid gas is higher than the conventional thing, and more equivalent to the former in a small quantity or high can be attained, and the efficient acid gas processing agent which can moreover decrease the yield of fly ash can be obtained easily. this invention method can demonstrate many effects well especially as a method of improving in the case of using slaked lime whose quality which was difficult for use in the former is not good as an acid gas processing agent including the slaked lime particles which have low specific surface area originally, for example, the slaked lime which carried out dry slaking of the dish-grilled-with-salt quicklime, and non-purity, such as a coarse particle. If the acid gas processing agent which is obtained by this invention method and which increased the specific surface area of slaked lime particles is contacted to acid gas, such as garbage incineration waste gas, reactivity with an acid gas ingredient will increase, Decrease the amount of consumption of an acid gas processing agent, raise the extraction ratio of an acid gas ingredient, or, Being able to decrease the yield of treatment objects, such as fly ash produced in an acid gas ingredient solvent wiping removal, since it is hard to form a precipitate, transportation among a pipe becomes easy, and the suspension of the slaked lime particles by which detailed granulation was moreover carried out brings about the advantage that piping, wear of an injection nozzle, a blockade, etc. by the particles in suspension can be prevented. Therefore, especially the acid gas processing agent obtained by this invention method is suitable for processing of the garbage incineration waste gas in incinerator plants, such as a city.

[Translation done.]